

## Status of the L Prize<sup>SM</sup> Competition: Mid-2011

### Competition Requirements

#### 60W Incandescent Replacement Lamp

- More than 90 lm/W
- Less than 10 watts
- More than 900 lumens
- More than 25,000 hour life
- More than 90 CRI
- Between 2700–3000K CCT

#### PAR 38 Halogen Replacement Lamp

- Competition temporarily closed; will reopen Summer 2011

#### 21st Century Lamp

- To be defined in a future L Prize program announcement

### What is the L Prize?

Created by Congress under the 2007 Energy Independence and Security Act (EISA), the L Prize competition was launched at LIGHTFAIR in 2008 by the U.S. Department of Energy (DOE). Its purpose: to spur lighting manufacturers to develop high-quality, high-efficiency solid-state lighting products to replace the common light bulb.

The legislation challenges industry to develop replacement technologies for two of today's most widely used and inefficient technologies:

- 60W Incandescent
- PAR 38 Halogen

Rigorous competition requirements include exceptional efficacy, long life, form factor that fits within the exterior

envelope defined by ANSI for the lamps being replaced, and suitability for mass manufacturing. Winning products will be recognized with cash awards and federal purchasing contracts, and featured in utility programs.

Specifications for a third category of L Prize—the 21st Century Lamp—will be announced at a later date.

### L Prize Timeline

LATE 2009	SPRING 2010	JUNE 2010 to MARCH 2011	SUMMER/FALL 2010	SPRING/SUMMER 2011
Philips submits 60W replacement entry	LM-79 photometric testing conducted on more than 200 samples	200 samples undergo 6,000 hours of long-term lumen maintenance testing, followed by stress testing	1,300 samples installed in more than 40 sites across North America in real applications	Technical Review Committee considers all test results and presents findings to DOE  <i>March 2011: LSG sends DOE "Intent to Submit" letter</i>  <i>June 2011: GE sends DOE "Intent to Submit" letter</i>

## What is the status of entries?

To date, the competition has received an entry in the 60W replacement category from one manufacturer, and two manufacturers have announced their intention to submit an entry in that same category. No entries have been received in the PAR 38 category.

The 60W replacement entry—submitted by Philips in Fall 2009—completed the first stage of the evaluation process: short-term photometric testing. During short-term testing, 200 product samples were subjected to IES LM-79-08 procedures measuring luminous flux, intensity distribution, correlated color temperature and chromaticity, color rendering index, and power factor. Instrumentation used in the testing included an integrating sphere and goniophotometer.

The next phase of evaluation—long-term testing—began in Spring 2010 at Pacific Northwest National Laboratory (PNNL) and entails at least 6,000 hours of testing of 200 samples. For this testing, PNNL built a new high-temperature apparatus with assistance from Orb Optronix. Ambient temperature in the testing apparatus is maintained at 45°C during the testing to simulate actual operating conditions.

In March 2011, stress testing was conducted to subject sample products to extreme conditions such as high and low temperatures, humidity, vibration, high and low voltage, and various electrical waveform distortions.

### Field Assessments of First 60W Entry

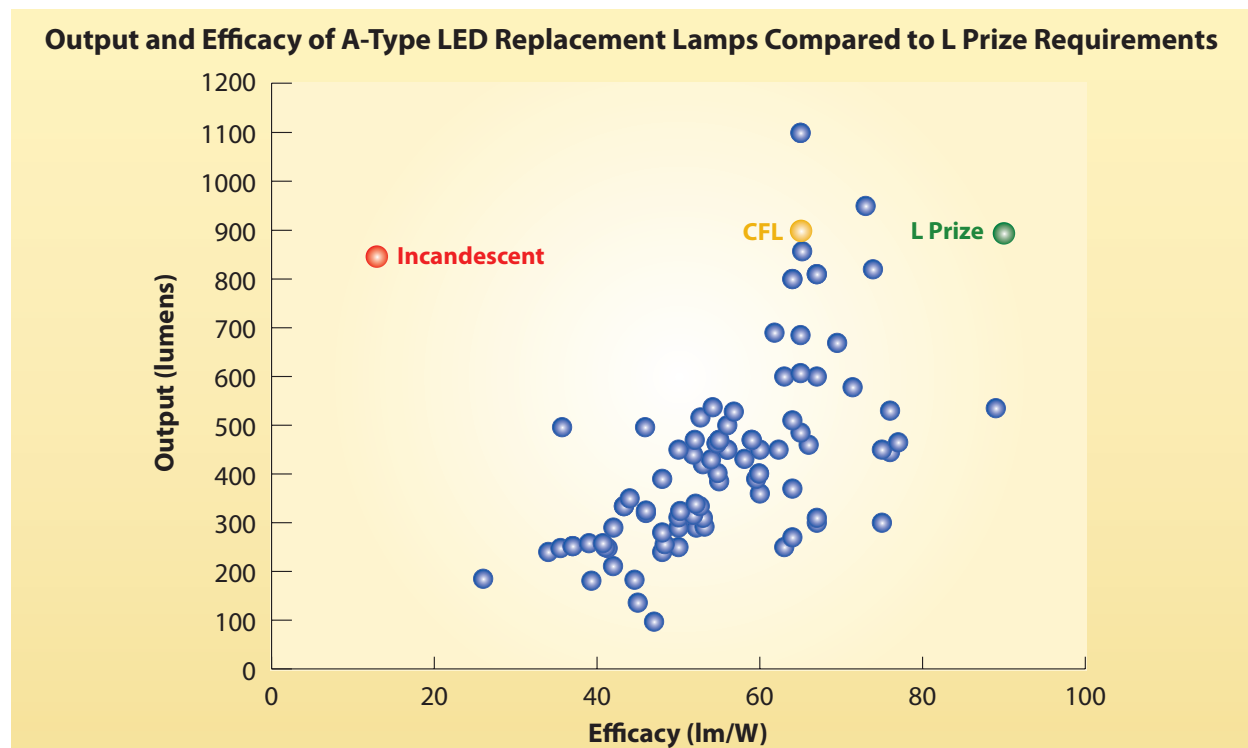
L Prize Partner	Field Assessment Applications
BC Hydro	Municipal building sconces, table lamps, boardroom ceiling fixtures
Cape Light Compact	Kitchen, bath, and table lamps in single-family residences
Commonwealth Edison	Elevator and office lobby can downlights, retail lightbars, cafeteria downlights, box office table lamps
DTE Energy	Hospital lamps, hotel hallways and reception area, car dealership ceiling fixtures
Efficiency Vermont	Housing authority wall fixtures
Eugene Water & Electric Board	Art museum downlights
Midwest Energy Efficiency Alliance	Pendants and sconces in office building, commercial retail ceiling fixtures
National Grid	Apartment building common areas and hallways, restaurant pendants
Platte River Power Authority	Residential chandeliers, table lamps, restaurant waiting area, hotel lobby, commercial lighting showroom
Progress Energy	Hospital waiting room, chapel, and control rooms, residential ceiling fixtures and table lamps, restaurant dining and bar area pendants
Puget Sound Energy	Customer homes, multi-family housing common areas, coffee shops/café
Sacramento Municipal Utility District	Grocery store pendants, catwalk, utility technology center, home and garden show
Southern California Edison	Hotel common areas and sleeping rooms, table lamps, wall and ceiling fixtures
Wisconsin's Focus on Energy program	Restaurant pendants, hotel meeting ballroom and dining room, senior living facility community room, office lobby floor lamps

In Summer 2010, 14 L Prize partners participated in field assessments of the Philips entry, demonstrating more than 1,300 samples at over 40 sites in a wide range of applications. Partners were geographically dispersed, with applications ranging from residential to commercial (see table on previous page). Results of these field assessments were recently reviewed by the Technical Review Committee (TRC), experts in energy conservation, market introduction, manufacturing, and lighting application who are determining whether the entry meets the competition requirements. The TRC also reviewed the short-term, long-term, and stress testing results, the commercial manufacturing plan submitted by Philips, and other findings and documentation related to the Philips entry.

## How well do LED A-lamp replacements currently on the market perform?

Legislation requires the L Prize 60W replacement lamp to produce at least 900 lumens. A July 2011 review of 94 LED A-lamp replacement products listed by DOE's Lighting Facts® program found that while most products produce between 200 and 600 lumens (equivalent to 25- to 40-watt incandescent lamps), several products had output higher than 800 lumens—a significant change from the previous six months.

Efficacy of listed products continued to range widely, with most products measuring between 35 and 70 lumens per watt (lm/W), six products achieving 75 lm/W, and one reaching 89 lm/W. But while those products at the higher end of the efficacy range compete with compact fluorescent lamps, the highest had a cool correlated color temperature (CCT) of 5000K. On the whole, CCTs are getting warmer, with 51 products in the 2700 to 3000K range (generally considered “warm white”), but 27 products still exceeded 5000K (“cool white”). Color rendering (CRI) for the LED products listed has improved, with the majority of products in the 80s and eight products exceeding 90.

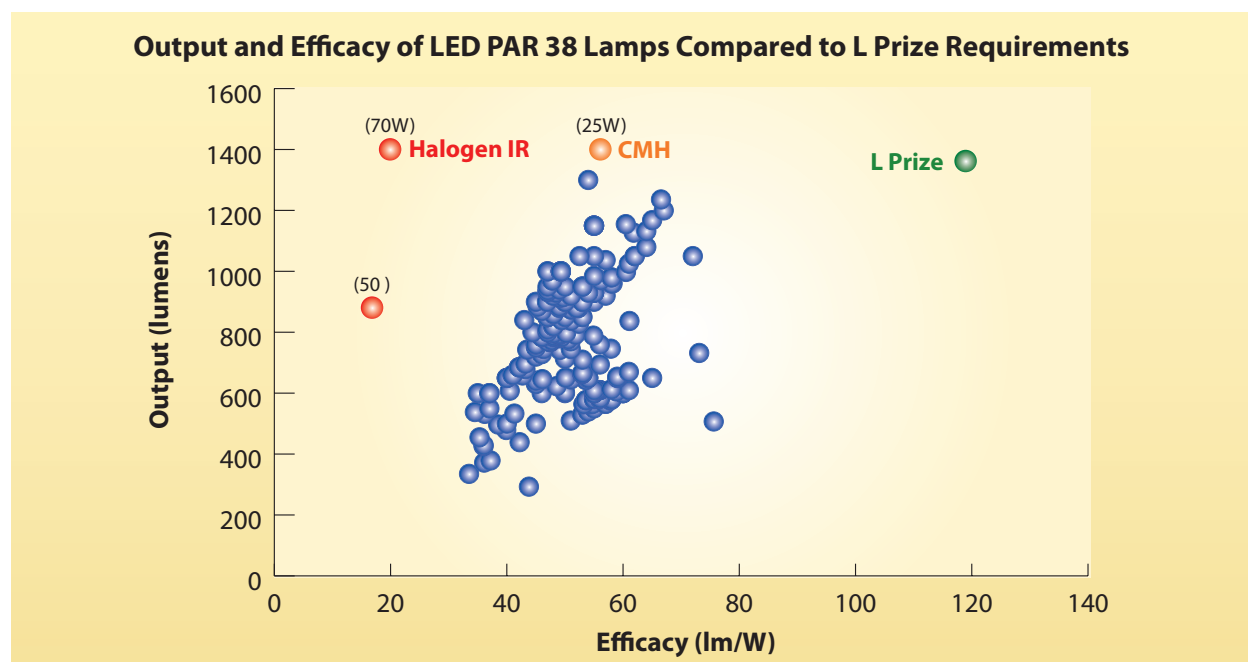


LED A-lamp replacements (blue dots) currently vary widely in terms of output and efficacy. Some are approaching L Prize targets in output or efficacy, a significant change since mid-2010. Sources: CALiPER test results and Lighting Facts database, July 2011.

## How close are manufacturers to the PAR 38 replacement targets?

Early in 2011, DOE temporarily closed the PAR 38 competition, and entries will not be accepted until the competition reopens. The EISA-legislated targets for the PAR 38 category remain in effect. DOE is considering lessons learned from the first entry to make revisions to the PAR 38 competition process.

To date, no L Prize entries have been received in the PAR 38 replacement category. The competition sets aggressive targets for efficacy and output that are challenging manufacturers to develop innovative solutions. The following graph, comparing LED PAR 38 lamps listed on Lighting Facts to these targets, shows the vast majority of available products are well below the L Prize target, but several products have outputs exceeding 1200 lumens, a recent development.



Most LED PAR 38 lamps (blue dots) currently have light output similar to 45- to 60-watt halogen lamps. L Prize requirements call for output similar to 90-watt standard halogen or 70-watt halogen infrared (HIR) lamps (1350 lumens), at a luminous efficacy more than double that of ceramic metal halide, and with power limited to a maximum of 11 watts. Sources: CALiPER test results and Lighting Facts database, July 2011.

## The Role of L Prize Partners

Nearly half of the L Prize partners actively participated in field assessments of the first entry. The 31 L Prize partners are poised to support the L Prize winners with promotions, incentives, and developing markets for winning products. Their combined influence extends to more than 100 million electricity customers.

For more information on L Prize, see [www.lightingprize.org](http://www.lightingprize.org).

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